CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

# USER MANUAL

# *LS300G-EU*
# *GSM/GPRS/EDGE/HSPA+*
# *Sierra Wireless Cellular Modem*

*Issued: 23.11.15*

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CSL 1082

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# *PLEASE READ FIRST*

## About this manual

Please note that this manual was originally produced by Campbell Scientific Inc. primarily for the North American market. Some spellings, weights and measures may reflect this origin.

Some useful conversion factors:

**Area:** 1 $in^2$ (square inch) = 645 $mm^2$

**Length:** 1 in. (inch) = 25.4 mm
1 ft (foot) = 304.8 mm
1 yard = 0.914 m
1 mile = 1.609 km

1 lb (pound weight) = 0.454 kg

**Pressure:** 1 psi ($lb/in^2$) = 68.95 mb

**Volume:** 1 UK pint = 568.3 ml
1 UK gallon = 4.546 litres
1 US gallon = 3.785 litres

**Mass:** 1 oz. (ounce) = 28.35 g

In addition, while most of the information in the manual is correct for all countries, certain information is specific to the North American market and so may not be applicable to European users.

Differences include the U.S standard external power supply details where some information (for example the AC transformer input voltage) will not be applicable for British/European use. *Please note, however, that when a power supply adapter is ordered it will be suitable for use in your country.*

Reference to some radio transmitters, digital cell phones and aerials may also not be applicable according to your locality.

Some brackets, shields and enclosure options, including wiring, are not sold as standard items in the European market; in some cases alternatives are offered. Details of the alternatives will be covered in separate manuals.

Part numbers prefixed with a "#" symbol are special order parts for use with non-EU variants or for special installations. Please quote the full part number with the # when ordering.

## Recycling information

At the end of this product's life it should not be put in commercial or domestic refuse but sent for recycling. Any batteries contained within the product or used during the products life should be removed from the product and also be sent to an appropriate recycling facility.

Campbell Scientific Ltd can advise on the recycling of the equipment and in some cases arrange collection and the correct disposal of it, although charges may apply for some items or territories.

For further advice or support, please contact Campbell Scientific Ltd, or your local agent.

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# *Precautions*

DANGER — MANY HAZARDS ARE ASSOCIATED WITH INSTALLING, USING, MAINTAINING, AND WORKING ON OR AROUND **TRIPODS, TOWERS, AND ANY ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC**. FAILURE TO PROPERLY AND COMPLETELY ASSEMBLE, INSTALL, OPERATE, USE, AND MAINTAIN TRIPODS, TOWERS, AND ATTACHMENTS, AND FAILURE TO HEED WARNINGS, INCREASES THE RISK OF DEATH, ACCIDENT, SERIOUS INJURY, PROPERTY DAMAGE, AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO AVOID THESE HAZARDS. CHECK WITH YOUR ORGANIZATION'S SAFETY COORDINATOR (OR POLICY) FOR PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT PRIOR TO PERFORMING ANY WORK.

Use tripods, towers, and attachments to tripods and towers only for purposes for which they are designed. Do not exceed design limits. Be familiar and comply with all instructions provided in product manuals. Manuals are available at www.campbellsci.eu or by telephoning +44(0) 1509 828 888 (UK). You are responsible for conformance with governing codes and regulations, including safety regulations, and the integrity and location of structures or land to which towers, tripods, and any attachments are attached. Installation sites should be evaluated and approved by a qualified engineer. If questions or concerns arise regarding installation, use, or maintenance of tripods, towers, attachments, or electrical connections, consult with a licensed and qualified engineer or electrician.

**General**

- Prior to performing site or installation work, obtain required approvals and permits. Comply with all governing structure-height regulations, such as those of the FAA in the USA.
- Use only qualified personnel for installation, use, and maintenance of tripods and towers, and any attachments to tripods and towers. The use of licensed and qualified contractors is highly recommended.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- Wear a **hardhat** and **eye protection**, and take **other appropriate safety precautions** while working on or around tripods and towers.
- **Do not climb** tripods or towers at any time, and prohibit climbing by other persons. Take reasonable precautions to secure tripod and tower sites from trespassers.
- Use only manufacturer recommended parts, materials, and tools.

**Utility and Electrical**

- **You can be killed** or sustain serious bodily injury if the tripod, tower, or attachments you are installing, constructing, using, or maintaining, or a tool, stake, or anchor, come in **contact with overhead or underground utility lines**.
- Maintain a distance of at least one-and-one-half times structure height, or 20 feet, or the distance required by applicable law, **whichever is greater**, between overhead utility lines and the structure (tripod, tower, attachments, or tools).
- Prior to performing site or installation work, inform all utility companies and have all underground utilities marked.
- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.

**Elevated Work and Weather**

- Exercise extreme caution when performing elevated work.
- Use appropriate equipment and safety practices.
- During installation and maintenance, keep tower and tripod sites clear of un-trained or non-essential personnel. Take precautions to prevent elevated tools and objects from dropping.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.

**Maintenance**

- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

WHILE EVERY ATTEMPT IS MADE TO EMBODY THE HIGHEST DEGREE OF SAFETY IN ALL CAMPBELL SCIENTIFIC PRODUCTS, THE CUSTOMER ASSUMES ALL RISK FROM ANY INJURY RESULTING FROM IMPROPER INSTALLATION, USE, OR MAINTENANCE OF TRIPODS, TOWERS, OR ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.

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# *LS300G-EU GSM/GPRS/EDGE/HSPA+ Sierra Wireless Cellular Modem*

## 1. Introduction

This manual provides information for interfacing the Sierra Wireless LS300G-EU cellular modem to Campbell Scientific dataloggers.

The LS300G-EU digital cellular modem is manufactured by Sierra Wireless for use on GSM (Global System for Mobile Communications) networks. The modem is accessed through the Internet using TCP/IP communications protocol.

Use of the LS300G-EU requires an AT&T® GSM/GPRS/EDGE/HSPA+ business account or an equivalent account from another service provider. See Section 4.1, *Establish Cellular Service* *(p. 2)*, for more information.

For additional information on the LS300G-EU modem, see the Support section of the Sierra Wireless website.

Before using the LS300G-EU, please study

- Section 2, *Cautionary Statements* *(p. 1)*
- Section 3, *Initial Inspection* *(p. 1)*
- Section 4, *Quickstart* *(p. 2)*

## 2. Cautionary Statements

- READ AND UNDERSTAND the *Precautions* section at the front of this manual.

- CAUTION: This device uses considerably more power than cellular modems previously offered by Campbell Scientific (see Section 6, *Specifications* *(p. 8)*) and will require a larger power supply, switching power with the datalogger, or a combination of these to ensure the battery is not drained. See Appendix A, *Controlling Power to the LS300G-EU* *(p. A-1)*, for program examples of using switched 12V to control power to the LS300G-EU.

## 3. Initial Inspection

- Upon receipt of the LS300G-EU, inspect the package and contents for damage. File any damage claims with the shipping company.

- Immediately check package contents against the shipping documentation (see Section 3.1, *Ships With List* *(p. 1)*). Contact Campbell Scientific about any discrepancies.

### 3.1 Ships With List

- (1) grey power cable
- (1) Resource DVD

# 4. Quickstart

## 4.1 Establish Cellular Service

What you need:

- GSM/GPRS/EDGE/HSPA+ account established with your local carrier.

An Access Point Name (APN) must be associated with the account to make the modem accessible through the Internet. The user must program the APN name into the modem as described in Section 4.3, *Configure LS300G-EU* *(p. 3)*.

Your carrier will provide a Subscriber Identity Module (SIM) card for each modem. The SIM card must be installed inside of the modem as described in Section 4.2, *Install the SIM Card* *(p. 2)*. In addition to the SIM card, you should receive:

- 10-digit MSISDN number (telephone number associated with the SIM, used for billing)
- IP Address and APN for GSM/GPRS/EDGE/HSPA+ service

## 4.2 Install the SIM Card

The SIM in the LS300G-EU is a smartcard that securely stores the key identifying a mobile subscriber. You will only need to install the SIM once in the life of the modem.

To install the SIM card:

1. Remove the SIM card cover.
2. When viewed from the top, the notched corner of the SIM card faces towards the centre of the device as shown in Figure 4-1. **Gently** slide the card into the slot in the connector until it stops.
3. Replace the SIM card cover.

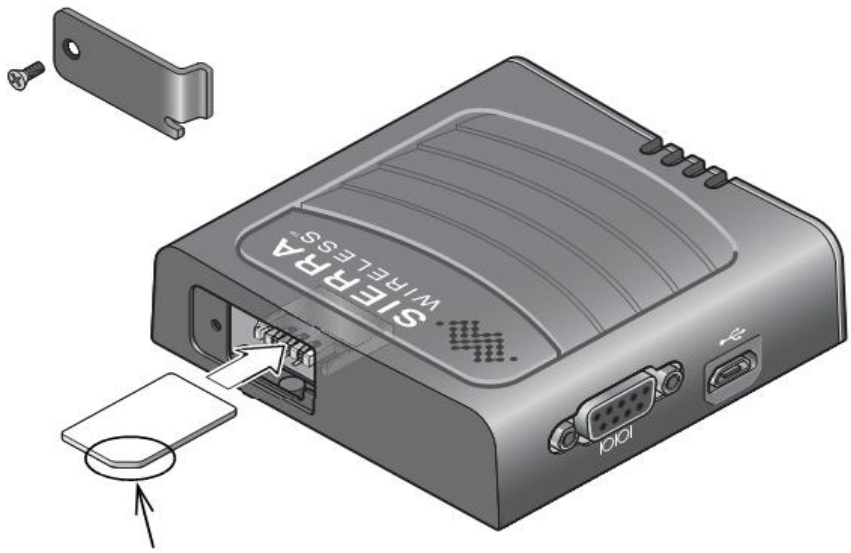



*Figure 4-1. SIM card installation*

## 4.3 Configure LS300G-EU

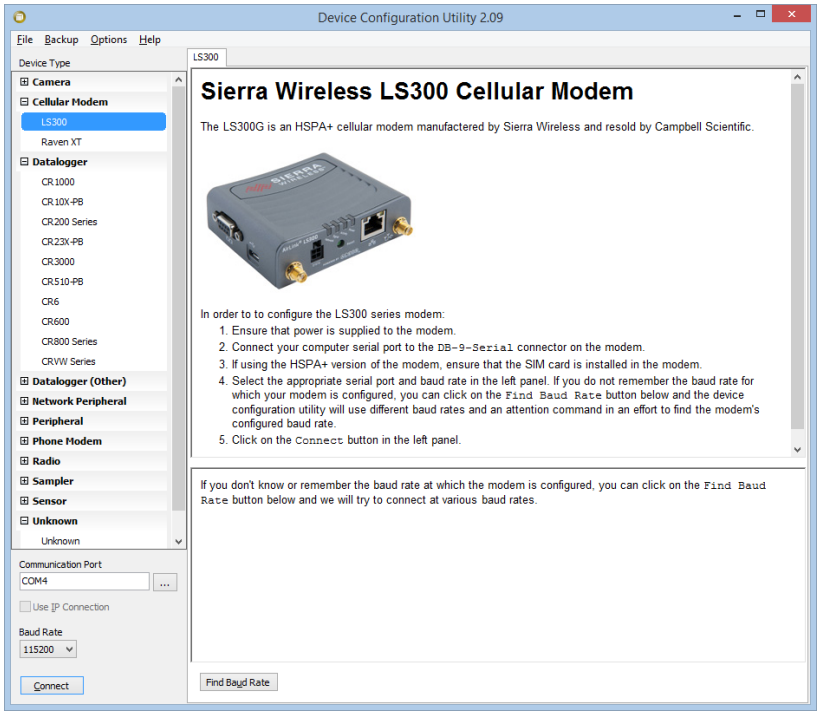
**NOTE**

Quickstart describes configuring the LS300G-EU in serial server mode. It may also be configured in Point-to-Point Protocol (PPP) mode. For a description of the modes, see Section 5, *Overview* ***(p. 8)***. For instructions on setting up the LS300G-EU in PPP mode, see Section 7.5, *AceManager and Template Files* ***(p. 14)***, and Section 7.6, *Enabling PPP Mode* ***(p. 17)***.

The LS300G-EU setup for serial server mode may be done with the *Device Configuration Utility (DevConfig)* version 2.09 or later. *DevConfig* may be updated/downloaded at no charge at *www.campbellsci.com/downloads*. (The LS300G-EU can also be set up in serial server mode using template files. See Section 7.5, *AceManager and Template Files* ***(p. 14)***.)

Connect a serial cable (for example, USB-to-serial, between the PC and the 9-pin serial port on the LS300G-EU.

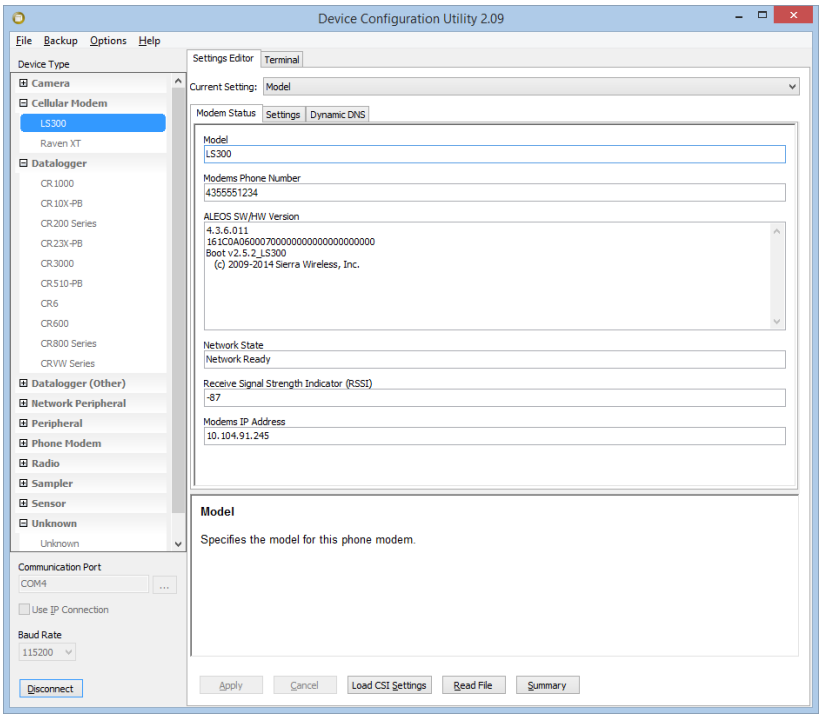
Open *DevConfig* (either from the PC's Start menu or by clicking the icon within *LoggerNet*) and select **LS300** from the **Cellular Modem** group in the left panel.


Device Configuration Utility 2.09
File Backup Options Help
Device Type
Camera
Cellular Modem
LS300
Raven XT
Datalogger
CR1000
CR10X-PB
CR200 Series
CR23X-PB
CR3000
CR510-PB
CR6
CR600
CR800 Series
CRVW Series
Datalogger (Other)
Network Peripheral
Peripheral
Phone Modem
Radio
Sampler
Sensor
Unknown
Unknown
Communication Port
COM4
Use IP Connection
Baud Rate
115200
Connect
LS300
Sierra Wireless LS300 Cellular Modem
The LS300G is an HSPA+ cellular modem manufactered by Sierra Wireless and resold by Campbell Scientific.
In order to to configure the LS300 series modem:
1. Ensure that power is supplied to the modem.
2. Connect your computer serial port to the DB-9-Serial connector on the modem.
3. If using the HSPA+ version of the modem, ensure that the SIM card is installed in the modem.
4. Select the appropriate serial port and baud rate in the left panel. If you do not remember the baud rate for which your modem is configured, you can click on the Find Baud Rate button below and the device configuration utility will use different baud rates and an attention command in an effort to find the modem's configured baud rate.
5. Click on the Connect button in the left panel.
If you don't know or remember the baud rate at which the modem is configured, you can click on the Find Baud Rate button below and we will try to connect at various baud rates.
Find Baud Rate

In the lower left, select the correct **Communication Port**. Select the **Baud Rate**. If unsure of the baud rate, click **Find Baud Rate**. For a new LS300G-EU, **115200** is the correct baud rate. Click **Connect**.

Click **Load CSI Settings** at the bottom of the screen.

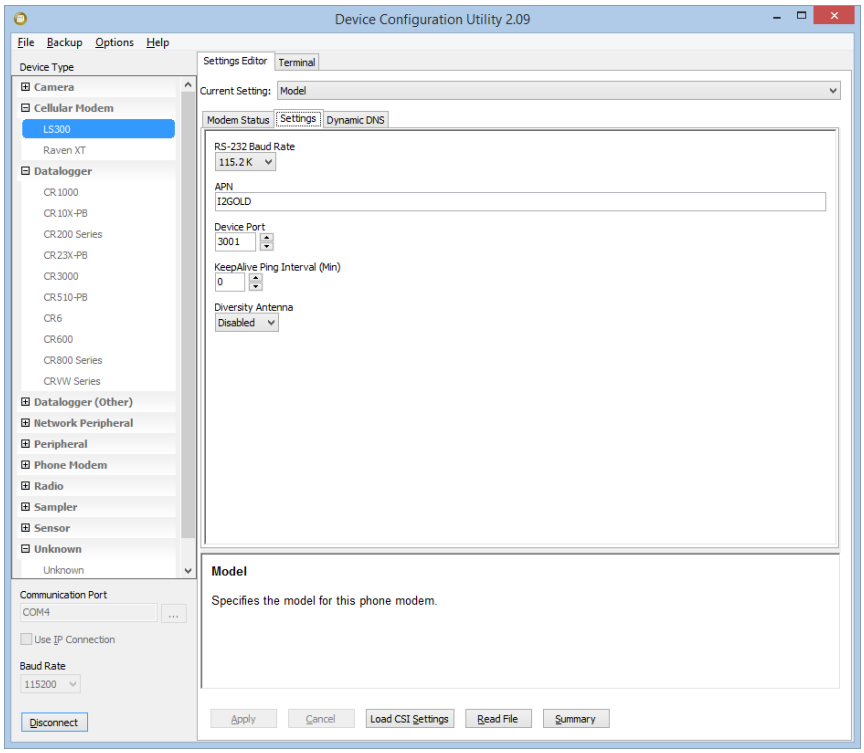
On the **Modem Status** tab, note that the **Modem Phone Number** and **Modem IP Address** are displayed, once the modem has authenticated on the network.




On the **Settings** tab:

- Set the **RS-232 Baud Rate** appropriate to the datalogger being used:
  - **115.2K** for CR800 Series, CR1000, CR3000, and CR6 Series
  - **9600** for all others
- Enter **I2GOLD** (or your custom APN) in the **APN** field.
- Note that the default **Device Port** number is **3001**. This is used in the *LoggerNet* setup below.

Click **Apply** to save the settings. Reset the modem by briefly pressing the **Reset** button on the front of the modem or by removing power from the modem.




## 4.4 Set up *LoggerNet*

The *LoggerNet* Network Map is configured from the *LoggerNet Setup* screen.

**NOTE**

*Setup* has two options, EZ (simplified) and Standard. Click on the **View** menu at the top of the *Setup* screen, and select **Standard** view.

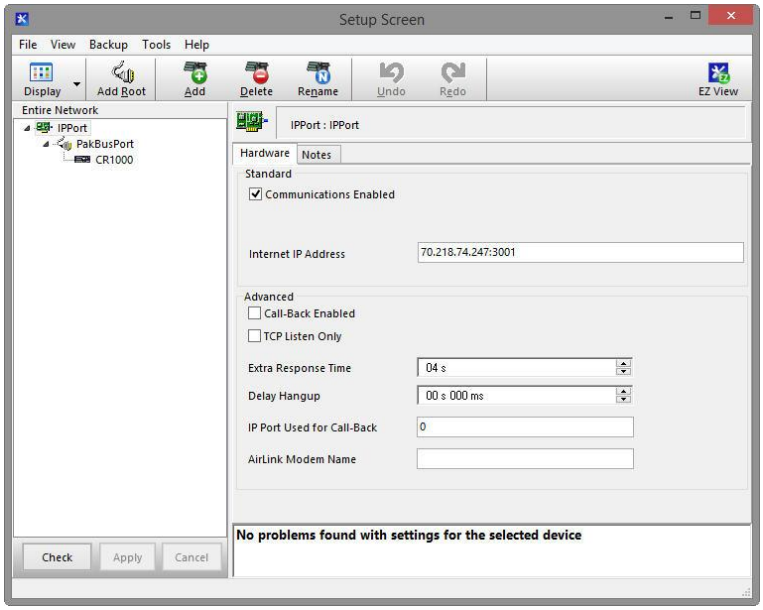
From the *LoggerNet* toolbar, click **Main | Setup** and configure the Network Map as described below.

1. Select **Add Root | IPPort**.

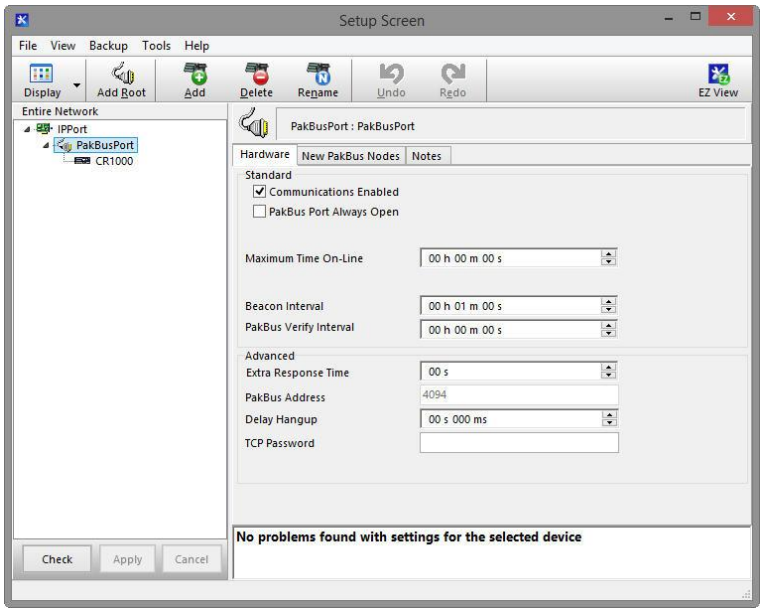
2. Add a datalogger to the **IPPort** (PakBus® dataloggers, for example the CR1000, require a PakBusPort).

3. Select the **IPPort** in the Network Map. Enter the LS300G-EU IP address (or domain name) and port number. The IP address and port number are input in the **Internet IP Address** field separated by a colon. Preceding zeros are not entered in the **Internet IP Address** (for example, 070.218.074.247 is entered as 70.218.74.247). *DevConfig* and the LS300G-EU template file configure the port number to 3001 for serial server mode. Set the **Extra Response Time** to **4** seconds.

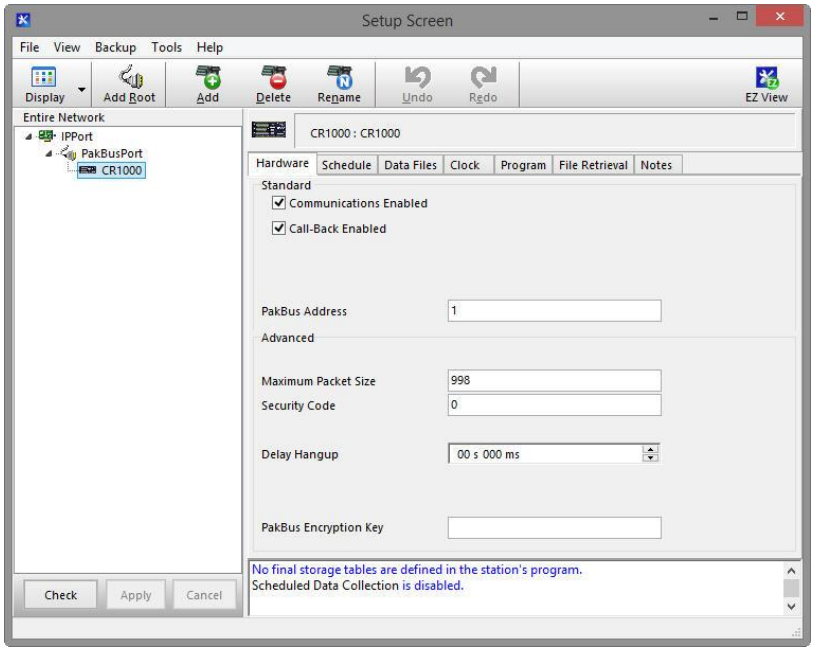
**Example settings for a static IP address:**




4. For PakBus® dataloggers, leave the default settings for the **PakBusPort**. **PakBus Port Always Open** should not be checked.



5. For PakBus® dataloggers, set the **PakBus Address** to match that of the datalogger (default address in the datalogger is 1). Click **Apply** to save the changes.

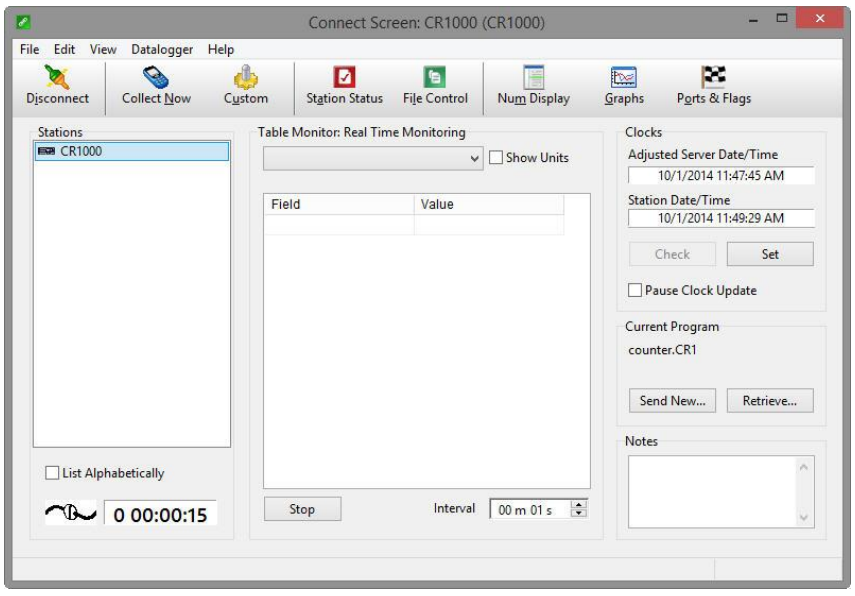



## 4.5 Set Up Hardware

The simplest hardware setup for modern dataloggers is to connect a null modem cable (CSI pn #18663) between the RS-232 ports of the datalogger and the LS300G-EU. See Section 7.3, *Wiring and Connections* ***(p. 10)***.

## 4.6 Test the Connection

After the Network Map has been configured, test the cellular connection using the *Connect* screen as shown below. Click on the appropriate station and click **Connect** to initiate a call to the datalogger. If the call is successful, the connectors at the bottom of the screen will come together and clock information from the datalogger will be displayed in the **Station Date/Time** field. If the connection fails, a **Communications Failure** message will be displayed. Troubleshooting procedures can be found in Section 9, *Troubleshooting* ***(p. 20)***.



# 5. Overview

The LS300G-EU modem may be configured in one of two ways, depending on the communications type and needs of the user. For many applications that just need a connection for data collection and datalogger maintenance or monitoring, setup as a serial server is sufficient. In this mode, the modem receives IP communications over the cellular network and converts those to serial (RS-232) communications to pass on to the datalogger. From the datalogger's perspective, this is no different than a serial cable connecting it to a PC. Section 4, *Quickstart* *(p. 2)*, describes setting up the LS300G-EU in serial server mode.

Alternatively, if IP communications are needed on the datalogger, the modem may be set up in Point-to-Point Protocol (PPP) mode. In this mode, the modem simply passes IP communications directly to the datalogger. This enables features such as FTP, HTTP, and emailing. For information on configuring the LS300G-EU in PPP mode, see Section 7.5, *AceManager and Template Files* *(p. 14)*, and Section 7.6, *Enabling PPP Mode* *(p. 17)*. See Appendix B, *EmailSend Using the Gmail Outgoing SMTP Server* *(p. B-1)*, for more information on emailing.

# 6. Specifications

## 6.1 LS300G-EU Specifications

Sierra Wireless AirLink® LS300 cellular modem (SL8092 radio module)

- Network: 3G HSPA+ with fallback to GSM/GPRS/EDGE

**Host Interfaces**

- 10/100 Base-T RJ45 Ethernet
- RS-232 serial port, DB9 female
- USB version 2.0 with micro-B connector
- 2 SMA antenna connectors (primary, GPS/diversity)
- Active antenna support

**Power**

- Input Voltage: 7 to 28 Vdc
- Current Consumption (@12 Vdc)
  - Dormant (idle for 10 to 20 s): 185 mA
  - Transmit/Receive: 255 mA

**Frequency**

- GSM/GPRS/EDGE: 900/850/900/1800 MHz
- HSPA+[WCDMA]: 900/2100 MHz (European version)
- If WCDMA operation at 900/2100 MHz is required, an alternate radio module (SL8092) is available.

**Size**

- Dimensions: 76 mm x 90 mm x 25 mm (3.0 in x 3.5 in x 1.0 in)
- Weight: 190 g (6.7 oz)

**Environmental**

- Operating Temperature Range: –30 to 70 °C (–22 to 158 °F)
- Storage Temperature: –40 to 85 °C (–40 to 185 °F)
- Humidity: 90% @ 60 °C
- Military Specification : MIL-STD-810 conformance to thermal, mechanical shock, and humidity

**Industry Certifications**

- PRCRN, R&TTE, FCC, Industry Canada, CE, RoHS Compliant, Class 1 Div 2

# 7. Installation

## 7.1 Base Station Requirements for LS300G-EU

PC running Campbell Scientific's *LoggerNet* or *PC400* software with access to the Internet.

## 7.2 Datalogger Site Equipment

- LS300G-EU modem with power cable (included with modem).
- Datalogger — 21X, CR510, CR10(X), CR23X, CR7, CR2XX, CR1000, CR5000, CR3000, CR800 Series, CR6 Series.
- Modem Interface

  **If connecting to RS-232 port:**

  Null Modem Cable (pn #18663) — connects the modem to the CR23X, CR3000, CR800, CR2XX, CR1000, or CR5000 RS-232 port.

  **If connecting to CS I/O port:**

  SC105 or SC932A Interface — connects the modem to the 21X, CR510, CR10(X), CR7, or any current datalogger with a CS I/O port.

  The SC105 must be configured for use with the modem using *DevConfig*. Settings should be:

  CS I/O Mode: SDC Address 7, 8, 10, or 11
  RS-232 Mode: Modem
  Baud Rate: 115.2K or 9600 baud depending on datalogger model
  8 data bits, 1 stop bit, no parity

- LS300 Mounting Kit (pn #30988) — includes mounting hardware for securing the modem to below-referenced environmental enclosure and a 9-pin male to 9-pin female cable.
- Antenna — various antennas are available from Campbell Scientific. Contact a Campbell Scientific application engineer for help in determining the best antenna for your application.

*Figure 7-1. 9528 antenna for use with the LS300G-EU modem (other antennae are available)*

- Power Supply (see Section 7.4, *Power Considerations* *(p. 14)*).
- Environmental Enclosure — ENC10/12, ENC12/14, or ENC16/18.

## 7.3 Wiring and Connections

### 7.3.1 Modem Connection to the RS-232 Port

Part number #18663 Null Modem Cable is used to connect the modem to the CR23X, CR3000, CR800, CR2XX, CR1000 or CR5000 RS-232 port (not compatible with the 21X, CR510, CR10X, or CR7 dataloggers).

Part number #31055 RS-232/CPI RJ45 to DB9 Male DTE is used to connect the modem to the CR6.

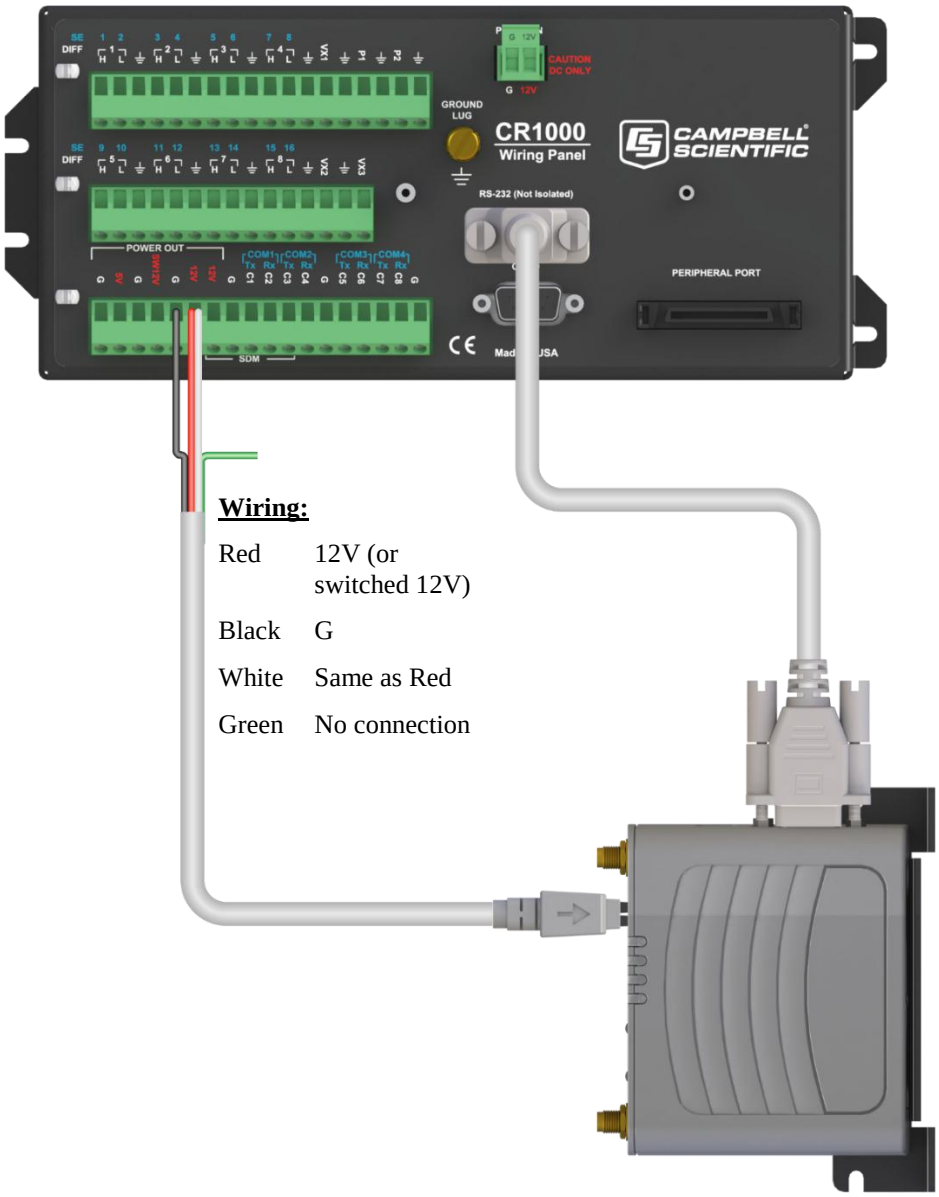



*Figure 7-2. Connections using pn #18663 Null Modem Cable*

### 7.3.2 Modem Connections to CS I/O Port Using the SC105

The SC105 interface is used to connect the modem to a datalogger CS I/O port, and is recommended for dataloggers with the PakBus® operating system. The SC105 can be connected directly to the modem RS-232 port. Alternatively, it can be connected to the modem using the serial cable supplied with the SC105 (pn #10873).

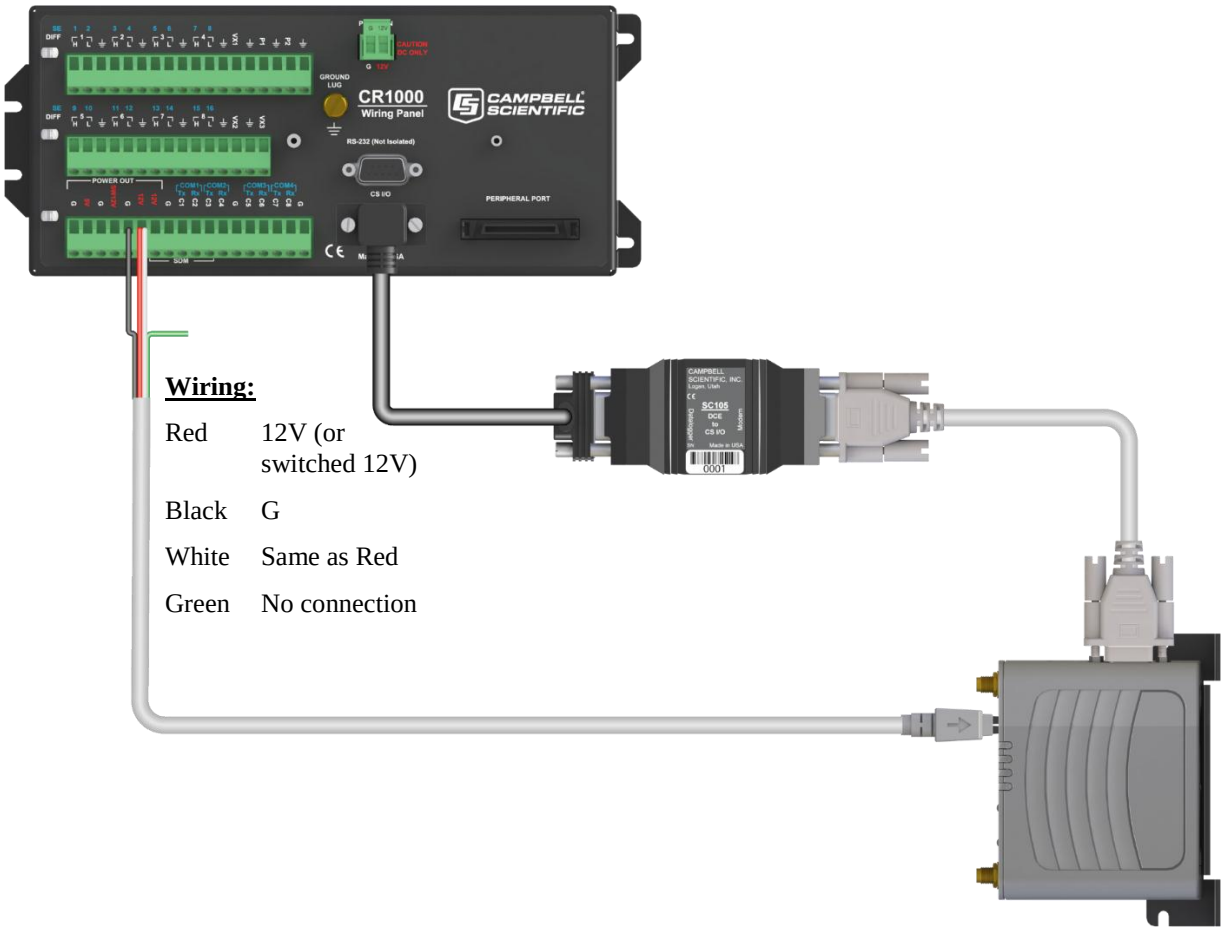



*Figure 7-3. Connections using the SC105*

SC105 Settings:

CS I/O Mode: SDC Address 7, 8, 10, or 11
RS-232 Mode: Modem
Baud Rate: 115.2K or 9600 baud depending on datalogger model
8 data bits, 1 stop bit, no parity

### 7.3.3 Modem Connection to the CS I/O Port Using the SC932A

The SC932A interface is used to connect the modem to the CS I/O port, and is recommended for dataloggers with the mixed-array operating system (for example, the CR10X). The SC932A can be connected directly to the modem RS-232 port. Alternatively, it can be connected to the modem using the serial cable supplied with the SC932A (pn #10873).

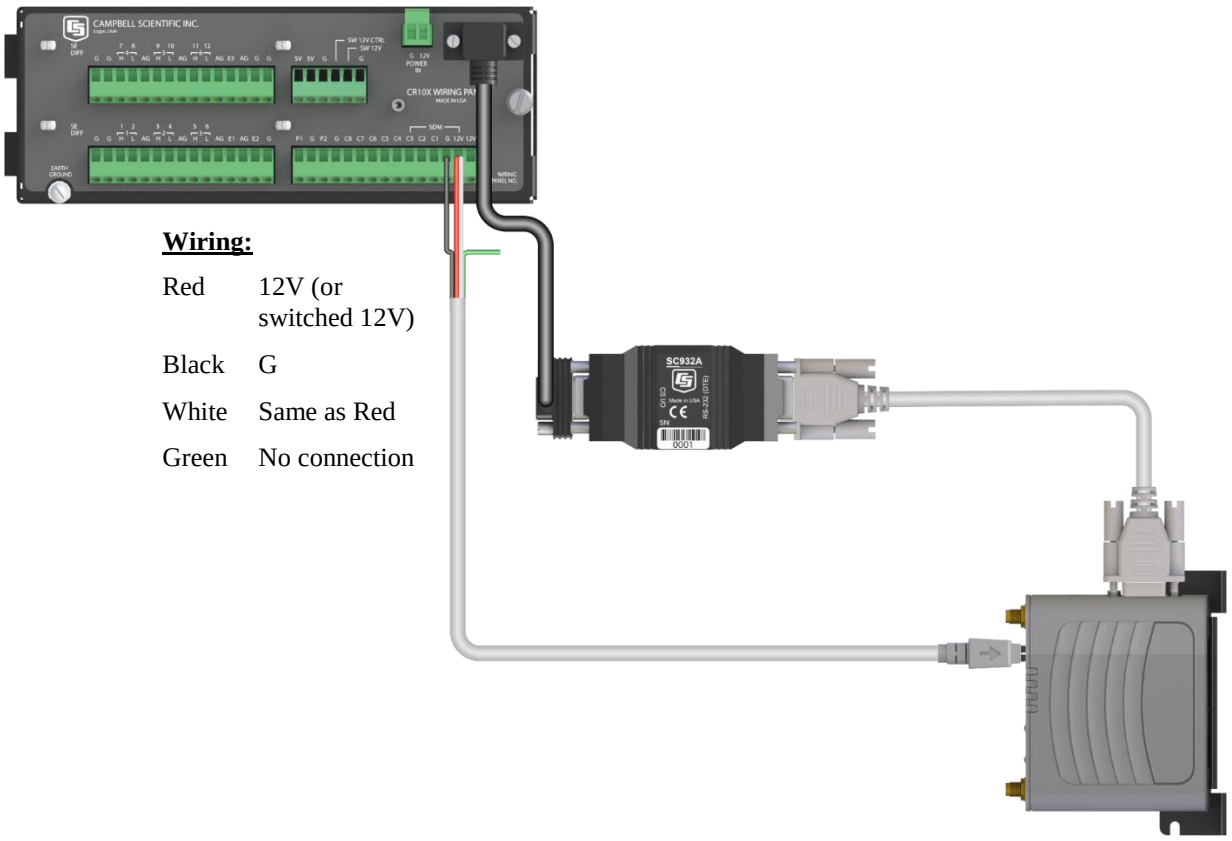



*Figure 7-4. Connections using the SC932A*

### 7.3.4 Antenna Connection

Connect the antenna to the SMA antenna connector as indicated below.

*Figure 7-5. Antenna Connection*

## 7.4 Power Considerations

**CAUTION** The LS300G-EU uses considerably more power than cellular modems previously offered by Campbell Scientific, Inc. and will require a larger power supply, switching power with the datalogger, or a combination of these to ensure the battery is not drained.

A power cable included with the modem connects to the datalogger 12V or switched 12V terminal. Connection to the switched 12V terminal allows the datalogger to switch power to the modem during scheduled transmission intervals if desired. See Appendix A, *Controlling Power to the LS300G-EU* *(p. A-1)*, for switched 12V program examples. Connect the red **and** white lead wires to 12V for constant power and to SW12 for program-controlled power, and the black lead to G (ground). The green wire lead is not necessary and can be removed or insulated.

When using the switched 12V terminal, the modem can typically be powered with a BP12 battery, CH150 charger/regulator, and SP10 solar panel.

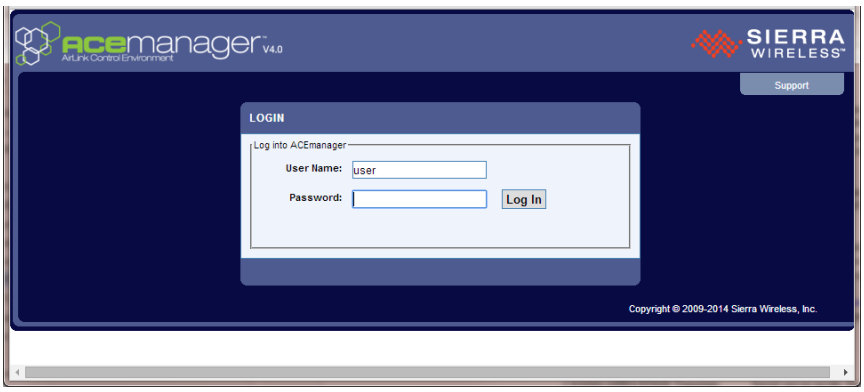
## 7.5 AceManager and Template Files

Section 4, *Quickstart* *(p. 2)*, describes how to set up the LS300G-EU in serial server mode using *DevConfig*. AceManager along with template files can be used to set up the LS300G-EU in serial server mode or PPP.

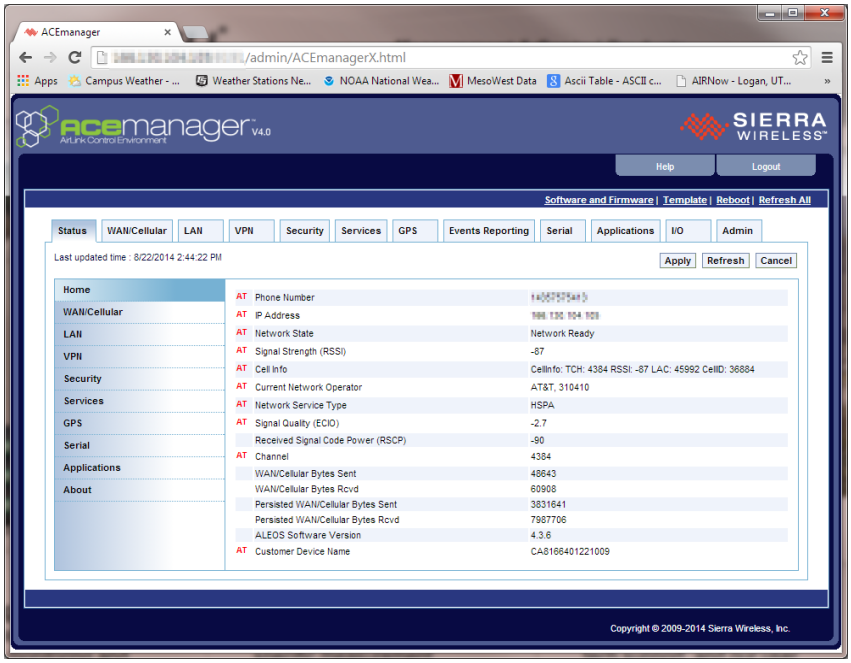
AceManager is accessed via a web browser. For initial setup or troubleshooting with a direct (cabled) connection, connect a standard Ethernet (RJ45) cable between the Ethernet port on the PC and that on the modem. Type **http://192.168.13.31:9191** into a web browser.

Once the modem is provisioned on the network, it may be accessed over the air by typing **http://** followed by the IP address (dynamic or static) of the modem, followed by the port **:9191**.

The first screen is a login (shown below). The default password is 12345 and it is strongly recommended to leave it as the default. If security is of concern, contact a Campbell Scientific application engineer to discuss options.



After entering the password and pressing enter (or clicking **Log In**), the following status screen is displayed.

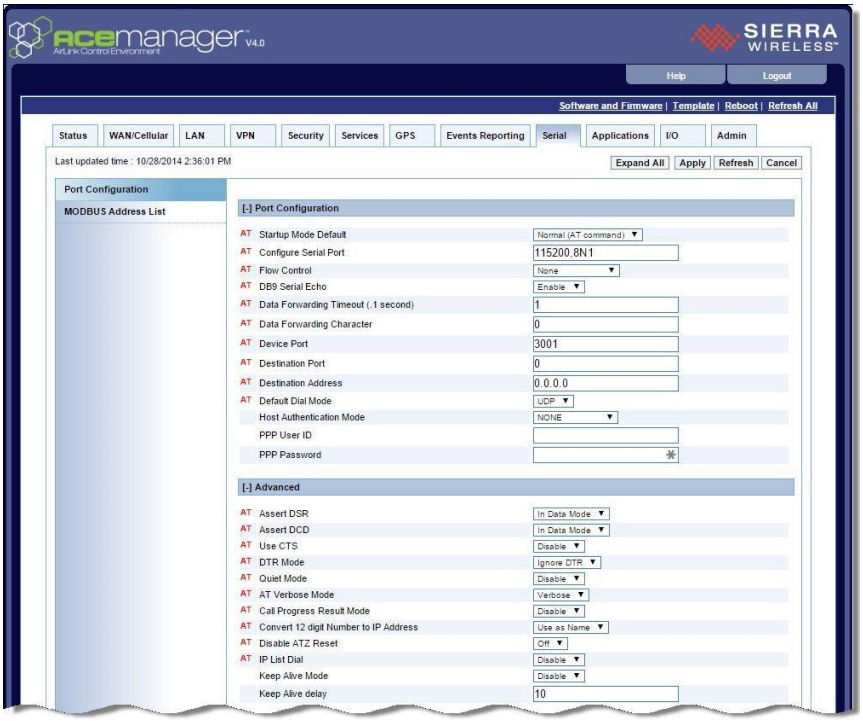



Template files from Campbell Scientific's website (*www.campbellsci.com/downloads*) are used to configure the LS300G-EU modem using AceManager.

| **Template files for the LS300G-EU** | **Description** |
|---|---|
| LS300G Template 115200 | Serial server mode or PPP mode, for newer dataloggers* |
| LS300G Template 9600 | Serial server mode, for older dataloggers** that support 9600 baud |

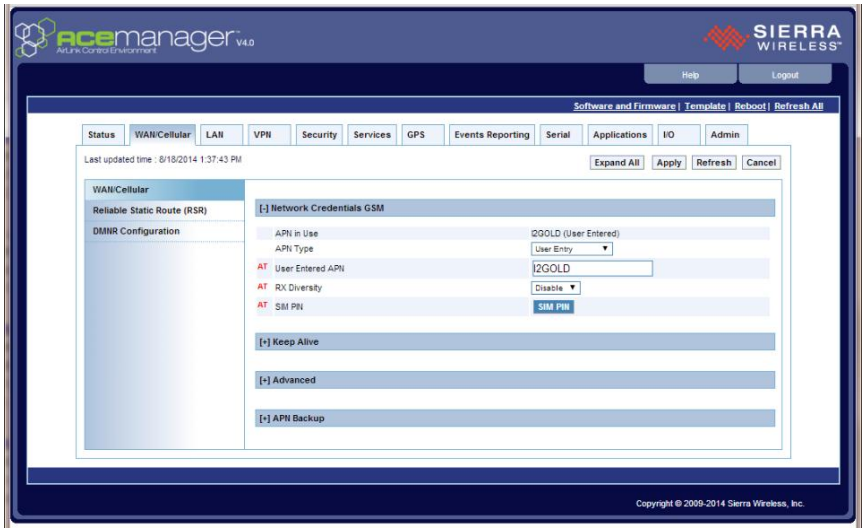
* CR1000, CR800, CR3000, CR6 Series
** CR200(X), CR10(X), CR510, CR500, 21X, and CR7

Click the **Template** link in the top right of the screen. When prompted for a template file name, select **LS300G-EU Template 115200** or **LS300G-EU Template 9600**. The following screen shows the settings under the Serial tab after the 115200 baud template file has been loaded.




Under **Advanced**, change **AT Verbose Mode** to **Numeric** for use with CR10(X), CR510, and CR23X dataloggers.

Click on **WAN/Cellular** for the following screen:




Enter the APN as shown in the screen above. The example is for an **APN** = **I2GOLD**.

After the template file has been loaded, and the APN entered, click **Apply** to save the changes in the modem**.**

Click **Reboot** to restart the modem. Alternately, reset the modem by pressing **Reset** on the front of the modem or by removing power from the modem.

Click **Logout** to terminate communications with the modem.

**WARNING**

**Unless you Apply the commands, the changes made will not be saved in the modem. For most commands, you must reboot the modem for the newly written values to take effect.**

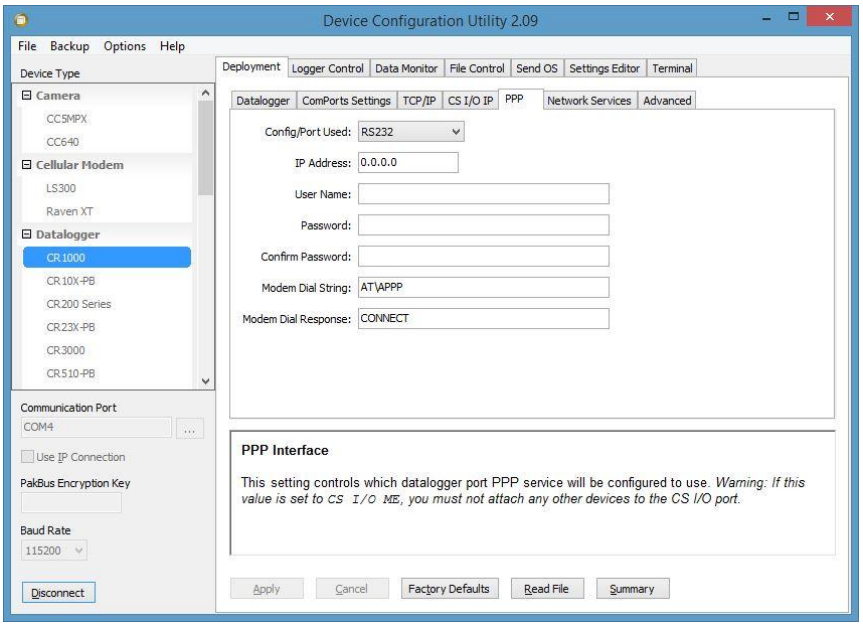
The modem is now set up in serial server mode. To enable PPP mode, see Section 7.6, *Enabling PPP Mode* ***(p. 17)***.

## 7.6 Enabling PPP Mode

The first step in enabling PPP mode is using the template file to configure the LS300G-EU as described in Section 7.5, *AceManager and Template Files* ***(p. 14)***.

After configuring the modem, you must use *DevConfig* to configure the datalogger for PPP mode.

Connect to your datalogger in *DevConfig* and go to the **PPP** tab.

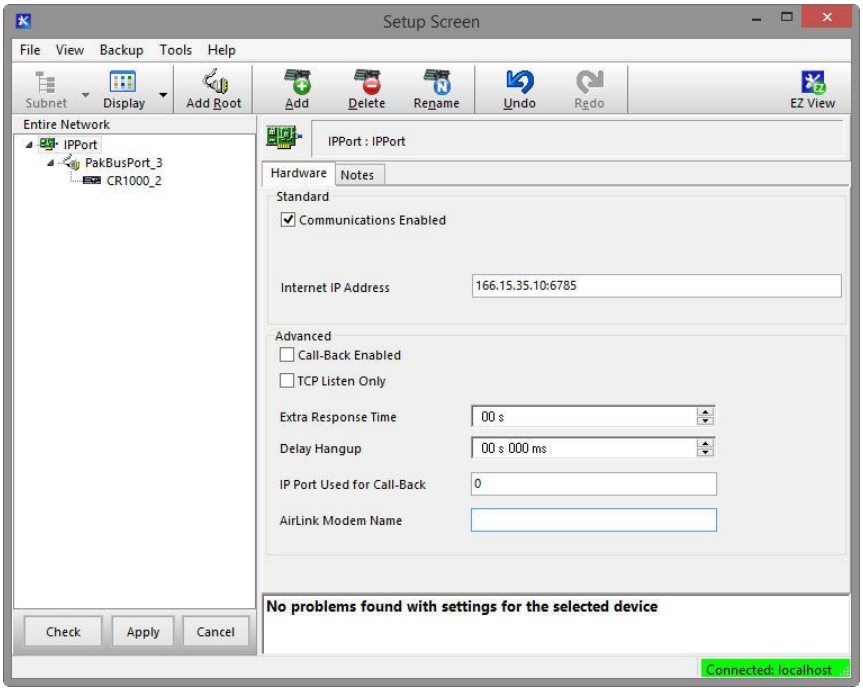



For the **Config/Port Used**, use the drop-down list to select the datalogger port you wish to use for PPP. **RS-232** is the standard choice, but any port in the drop-down list can be used.

Set the **Modem Dial String** to **AT\APPP**.

Press **Apply** to apply the changes.

With PPP enabled, PakBus/TCP communications use port 6785. Therefore, in *LoggerNet* use :6785 after the IP address or domain name as shown below.



# 8. Operation

## 8.1 Ports

**RS-232**

The RS-232 port is the main port used with Campbell Scientific dataloggers. Its function is described throughout this manual.

**USB**

The USB Port is not used in Campbell Scientific applications.

**Ethernet**

The Ethernet port may be used in place of PPP Mode to get to the IP stack of the datalogger. However, this method comes with higher current drain for both the modem and the datalogger. See Appendix D, *Using the LS300G-EU Ethernet Port* *(p. D-1)*, for more information.

## 8.2 LED Indicator Lights

When your LS300G-EU is connected to power and an antenna, there is a specific pattern to the lights to indicate its operation mode.

**LED Colour Coding:**

- **Off** – No activity
- **Red** – No functionality
- **Yellow** – Limited functionality
- **Green** – Full functionality
- **Blinking** – Altered or reduced functionality

**Network LED –** monitors the cellular network

- **Red –** no cellular coverage
- **Flashing red –** attempting to connect to cellular network
- **Yellow –** cellular network found, modem connecting
- **Flashing yellow –** unable to authenticate on the network
- **Green –** connected to cellular network
- **Flashing green –** roaming

**Signal LED** – shows the strength of the cellular signal

- **Flashing red** – no signal (RSSI worse than –110 dBm)
- **Red** – poor signal (RSSI between –100 and –110 dBm)
- **Yellow** – marginal signal (RSSI between –85 and –100 dBm)
- **Green** – good signal (RSSI better than –85 dBm)

**Activity LED** – indicates whether data are currently being transferred

- **Off** – normal
- **Flashing green** – transmitting or receiving

**Power LED** – monitors power and GPS status

- **Off** – no power or power outside operating range
- **Red** – not operational
- **Yellow** – entering low power mode or boot
- **Green** – power within range and normal operation
- **Green with yellow flash** – GPS fix

**Light Patterns**

- **Normal** – Each LED, mentioned above, lit as applicable
- **Start up** – The LEDs will cycle
- **Configuration Reset** – LEDs flashing yellow

## 8.3 Reset Button

The **Reset** button has two functions. If it is quickly depressed and released, the modem will simply power cycle the internal hardware. If, however, the reset is depressed and held for several seconds (count to 60 slowly and wait for all of the lights to flash yellow continuously), the ALEOS® configuration settings will return to the factory defaults.

# 9. Troubleshooting

Note that it can take several minutes (at least three) for the L300G to boot and authenticate on the network. If you are not able to communicate after five minutes, use the flowcharts below to troubleshoot the issue.

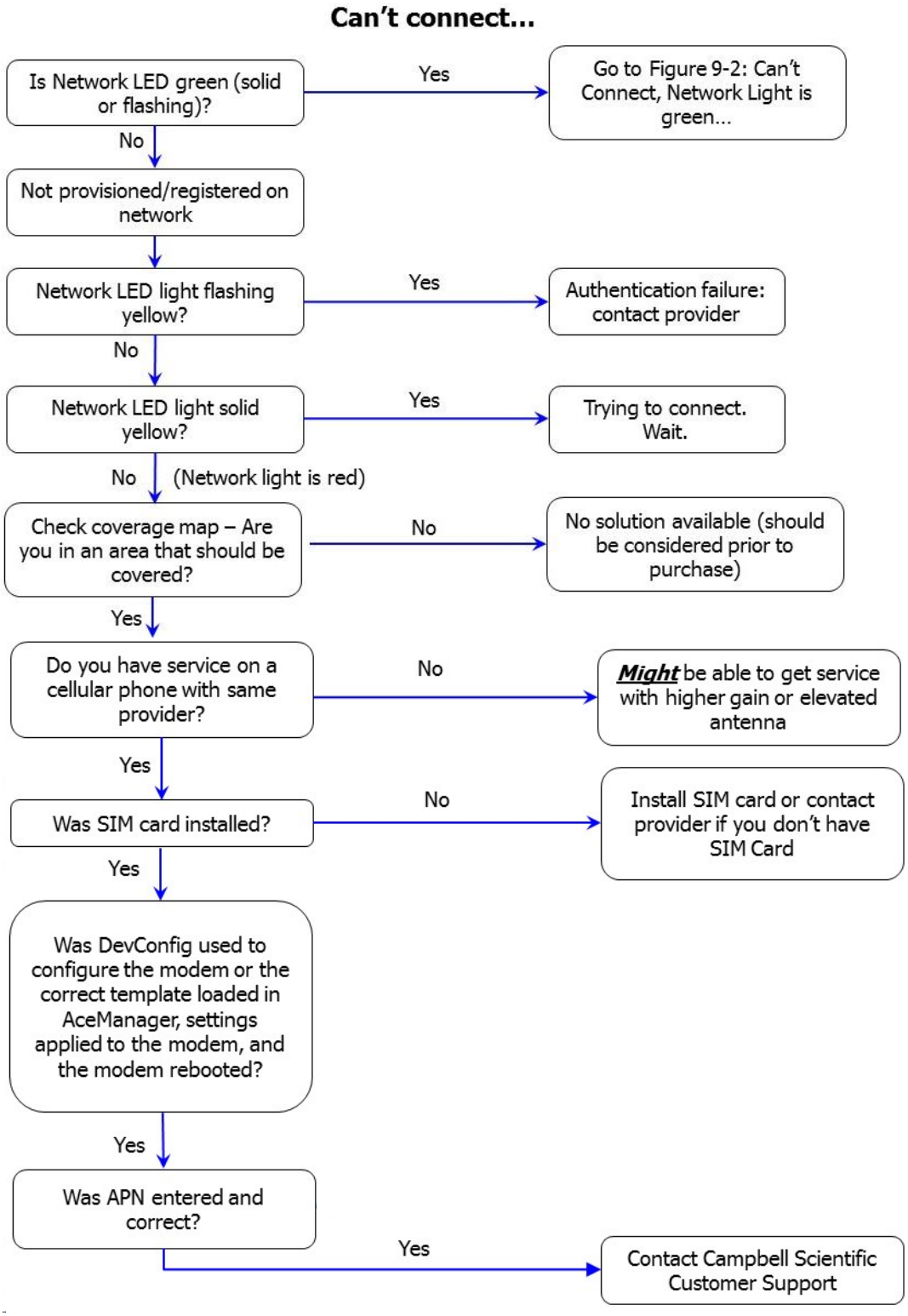

Can't connect...
Is Network LED green (solid or flashing)?
Yes
Go to Figure 9-2: Can't Connect, Network Light is green...
No
Not provisioned/registered on network
Network LED light flashing yellow?
Yes
Authentication failure: contact provider
No
Network LED light solid yellow?
Yes
Trying to connect. Wait.
No
(Network light is red)
Check coverage map – Are you in an area that should be covered?
No
No solution available (should be considered prior to purchase)
Yes
Do you have service on a cellular phone with same provider?
No
Might be able to get service with higher gain or elevated antenna
Yes
Was SIM card installed?
No
Install SIM card or contact provider if you don't have SIM Card
Yes
Was DevConfig used to configure the modem or the correct template loaded in AceManager, settings applied to the modem, and the modem rebooted?
Yes
Was APN entered and correct?
Yes
Contact Campbell Scientific Customer Support

*Figure 9-1. Can't Connect…*

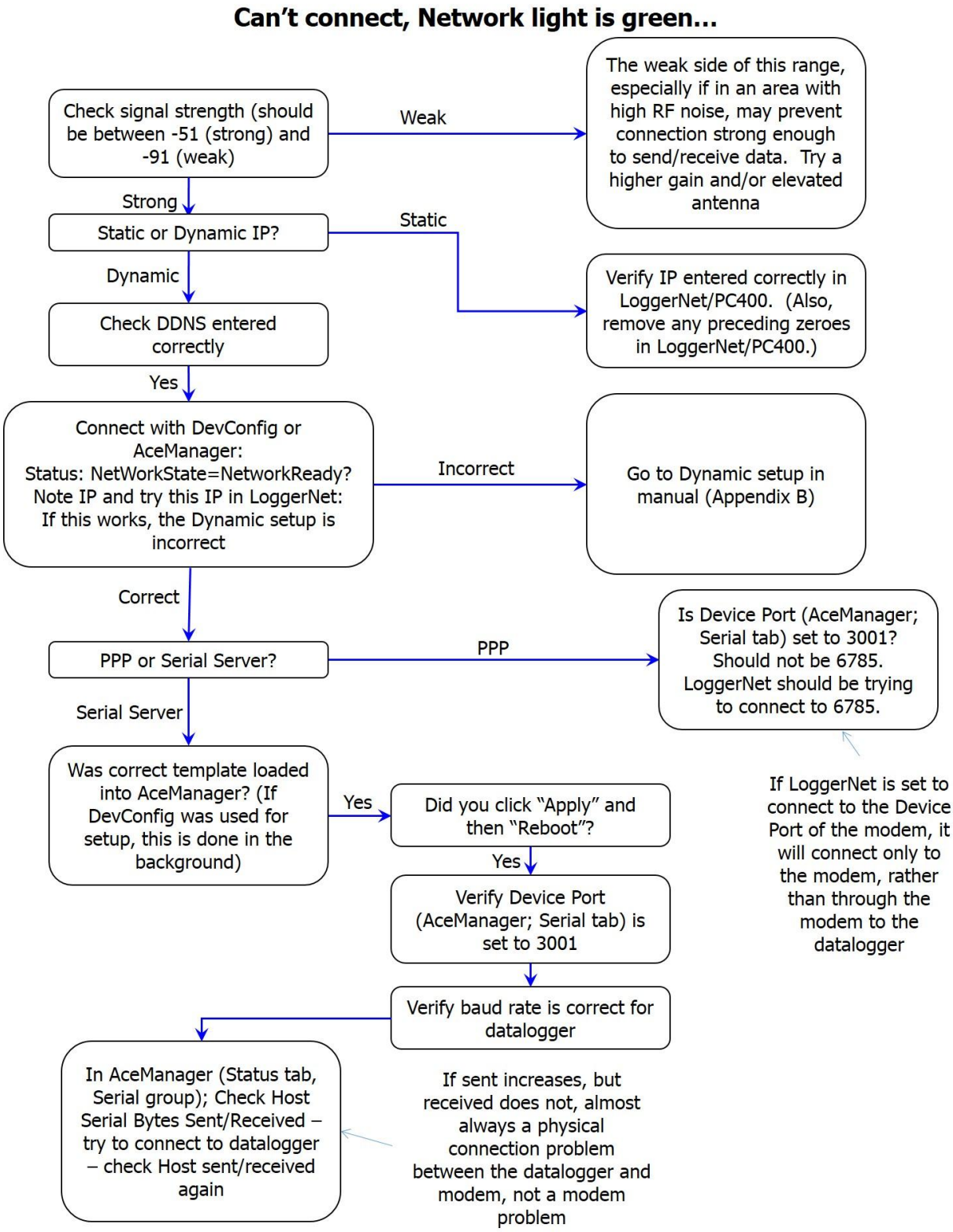

Can't connect, Network light is green…
Check signal strength (should be between -51 (strong) and -91 (weak)
Weak
The weak side of this range, especially if in an area with high RF noise, may prevent connection strong enough to send/receive data. Try a higher gain and/or elevated antenna
Strong
Static or Dynamic IP?
Static
Verify IP entered correctly in LoggerNet/PC400. (Also, remove any preceding zeroes in LoggerNet/PC400.)
Dynamic
Check DDNS entered correctly
Yes
Connect with DevConfig or AceManager:
Status: NetWorkState=NetworkReady?
Note IP and try this IP in LoggerNet:
If this works, the Dynamic setup is incorrect
Incorrect
Go to Dynamic setup in manual (Appendix B)
Correct
PPP or Serial Server?
PPP
Is Device Port (AceManager; Serial tab) set to 3001? Should not be 6785. LoggerNet should be trying to connect to 6785.
Serial Server
Was correct template loaded into AceManager? (If DevConfig was used for setup, this is done in the background)
Yes
Did you click "Apply" and then "Reboot"?
Yes
Verify Device Port (AceManager; Serial tab) is set to 3001
If LoggerNet is set to connect to the Device Port of the modem, it will connect only to the modem, rather than through the modem to the datalogger
Verify baud rate is correct for datalogger
In AceManager (Status tab, Serial group); Check Host Serial Bytes Sent/Received – try to connect to datalogger – check Host sent/received again
If sent increases, but received does not, almost always a physical connection problem between the datalogger and modem, not a modem problem

*Figure 9-2. Can't Connect, Network Light is Green…*

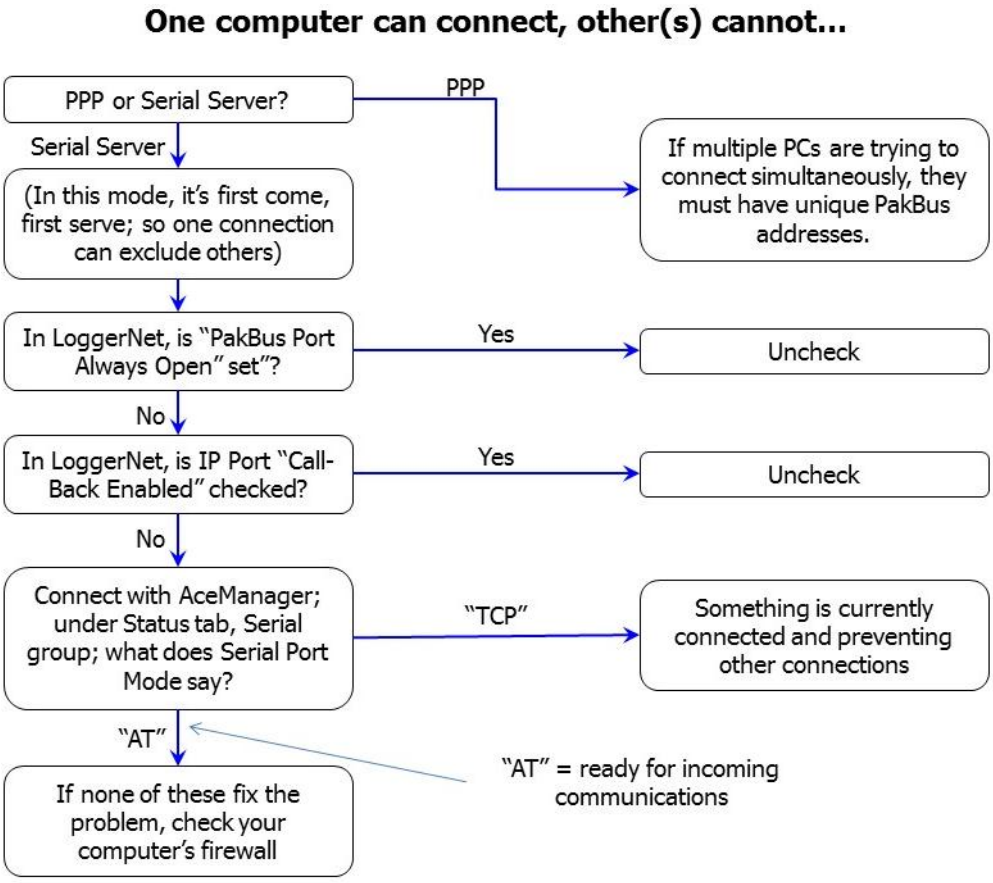

One computer can connect, other(s) cannot...
PPP or Serial Server?
PPP
Serial Server
If multiple PCs are trying to connect simultaneously, they must have unique PakBus addresses.
(In this mode, it's first come, first serve; so one connection can exclude others)
In LoggerNet, is "PakBus Port Always Open" set"?
Yes
Uncheck
No
In LoggerNet, is IP Port "Call-Back Enabled" checked?
Yes
Uncheck
No
Connect with AceManager; under Status tab, Serial group; what does Serial Port Mode say?
"TCP"
Something is currently connected and preventing other connections
"AT"
"AT" = ready for incoming communications
If none of these fix the problem, check your computer's firewall

*Figure 9-3. One computer can connect, other(s) cannot…*

# Appendix A. Controlling Power to the LS300G-EU

The LS300G-EU uses considerably more power than cellular modems previously offered by Campbell Scientific, Inc. Therefore, it may be necessary to use the datalogger to control power to the LS300G-EU. The following program examples show how to control power to the LS300G-EU using the switched 12V terminal on the datalogger.

The first program, created by *Short Cut*, uses the **TimeIsBetween** instruction to turn on SW12 for 15 minutes every 60 minutes between 9:00 a.m. and 5:00 p.m. (Note that the **TimeIsBetween** instruction requires operating system version 28 or later in the CR1000, CR3000, or CR800. It is supported in all CR6 operating systems.)

```
'CR6 Series
'Created by Short Cut (3.1)

'Declare Variables and Units
Public BattV
Public PTemp_C
Public SW12State As Boolean

Units BattV=Volts
Units PTemp_C=Deg C

'Define Data Tables
DataTable(Table2,True,-1)
  DataInterval(0,1440,Min,10)
  Minimum(1,BattV,FP2,False,False)
EndTable

'Main Program
BeginProg
  'Main Scan
  Scan(5,Sec,1,0)
    'Default Datalogger Battery Voltage measurement 'BattV'
    Battery(BattV)
    'Default Wiring Panel Temperature measurement 'PTemp_C'
    PanelTemp(PTemp_C,60)
    'SW12 Timed Control
    'Turn ON SW12 between 0900 hours and 1700 hours
    'for 15 minutes every 60 minutes
    If TimeIsBetween(540,1020,1440,Min) And TimeIsBetween(0,15,60,Min) Then
      SW12State=True
    Else
      SW12State=False
    EndIf
    'Always turn OFF SW12 if battery drops below 11.5 volts
    If BattV<11.5 Then SW12State=False
    'Set SW12-1 to the state of 'SW12State' variable
    SW12(1,SW12State,0)
    'Call Data Tables and Store Data
    CallTable Table2
  NextScan
```

The next program, also created by *Short Cut*, performs the same function as the first program (turn on SW12 for 15 minutes every 60 minutes between 9:00 a.m. and 5:00 p.m.) without using the **TimeIsBetween** instruction. This method should be used for CR1000, CR300 and CR800 operating systems prior to version 28.

```
'CR1000
'Created by Short Cut (3.1)

'Declare Variables and Units
Dim MinIntoDay
Public BattV
Public PTemp_C
Public SW12State As Boolean

Units BattV=Volts
Units PTemp_C=Deg C

'Define Data Tables
DataTable(Table2,True,-1)
  DataInterval(0,1440,Min,10)
  Minimum(1,BattV,FP2,False,False)
EndTable

'Main Program
BeginProg
  'Main Scan
  Scan(5,Sec,1,0)
    'Default Datalogger Battery Voltage measurement 'BattV'
    Battery(BattV)
    'Default Wiring Panel Temperature measurement 'PTemp_C'
    PanelTemp(PTemp_C,_60Hz)
    'SW12 Timed Control
    'Get minutes into current day
    MinIntoDay=Public.TimeStamp(4,1)/60
    'Turn ON SW12 between 0900 hours and 1700 hours
    'for 15 minutes every 60 minutes
    If (MinIntoDay>=540 And MinIntoDay<1020) And ((MinIntoDay-540) Mod 60 < 15) Then
      SW12State=True
    Else
      SW12State=False
    EndIf
    'Always turn OFF SW12 if battery drops below 11.5 volts
    If BattV<11.5 Then SW12State=False
    'Set SW12 to the state of 'SW12State' variable
    SW12(SW12State)
    'Call Data Tables and Store Data
    CallTable Table2
  NextScan
```

# Appendix B. EmailSend Using the Gmail Outgoing SMTP Server

The datalogger has a mail client in it similar to a mail client on a computer. For the datalogger to send an email, it needs an SMTP server to send through like any other mail client. The Gmail SMTP server can be used for sending outgoing email from the datalogger. Both the modem and the datalogger must be configured for PPP as described in Section 7.5, *AceManager and Template Files* *(p. 14)*, and Section 7.6, *Enabling PPP Mode* *(p. 17)*.

## B.1 Setting up a Gmail Account

First you need to create a Gmail account, if you do not already have one. To create a gmail account, go to *www.gmail.com* from your PC. Gmail accounts are free of charge.

The credentials to access the mail server will be the username and password used when creating the Gmail account.

In the following example program you will see:

- ServerAddr set to smtp.gmail.com:587
- UserName set to (the Gmail account user name).
- Password (the one you established at Gmail)

**NOTE** Gmail requires Transport Layer Security (TLS) to connect to their mail server. You must go into the Settings Editor in *DevConfig* to enable TLS in the datalogger.

In 2013, Gmail changed the way they receive email. The changes require a port number of 587 to be added to the IP address or server name you are sending to (for example, 174.194.68.108:587, smtp.gmail.com:587). This will allow for the datalogger to establish a TLS connection with the correct SMTP (Simple Mail Transfer Protocol) port on Gmail's SMTP servers.

Also, a new security feature has been added to Gmail that will prompt if the device/PC sending the email is authorized to do so. You will see a message in the Result variable (of the EmailSend Instruction) that refers to opening your email account in your web browser. If you see this message, open your web browser and point it to *http://email.google.com*. Enter the username and password that your datalogger is using to send email. You should then see a red bar at the top of the browser screen. Follow the listed instructions to allow the datalogger to send email.

## B.2 Sending to Multiple Addresses

Sending to multiple email address can be done by using a comma to separate the email addresses (4355551212@hotmail.com, 4355551234@vtext.com).

# B.3 Sending a Text Message to a Phone

To send a text message to a phone, the email needs to be converted to a text message via an email-to-text message gateway. Most cellular providers have an email-to-text message service for their phone subscribers. To send a text message to AT&T® Wireless phone subscribers, send an email to the (10 digit phone number of the person's phone)@vtext.com (4355551234@vtext.com).

Most text messages are limited to 160 characters, so any email messages greater than 160 characters will be truncated.

**Email-to-Text Message Gateways**

T-Mobile: *phonenumber@tmomail.net*
Virgin Mobile: *phonenumber@vmobl.com*
AT&T®: *phonenumber@txt.att.net*
Sprint: *phonenumber@messaging.sprintpcs.com*
Verizon: *phonenumber@vtext.com*

# B.4 EmailSend Program Example

The following example sends an email message when an alarm condition is True. Both the CR1000 and LS300G-EU modem must be configured as PPP as described in Section 7.5, *AceManager and Template Files* *(p. 14)*, and Section 7.6, *Enabling PPP Mode* *(p. 17)*. Transport Layer Security (TLS) must be enabled in the datalogger to use the Gmail mail server. (TLS is automatically enabled in the CR6 and in the CR1000/CR3000/CR800 with OS revision 24 or later.)

```
'Main program variables

Public Batt, RefTemp, Temp

'declare Email parameter strings (as constants), Message String & Result Variable
Const ServerAddr="smtp.gmail.com:587"
Const UserName="username@gmail.com"
Const Password="password"
Const ToAddr="datalogger@hotmail.com, 4355551234@vtext.com"
Const FromAddr=UserName
Const Subject="Email Message Test"
Const Attach=""
Const CRLF = CHR(13) & CHR(10)

Public AlarmTrigger As Boolean
Dim Message As String * 250
Public EmailServerResp As String * 50
Public EmailResult

DataTable (TenSecData,True,-1)
  DataInterval (0,10,Sec,10)
  Sample (1,Batt,FP2)
  Sample (1,Temp,FP2)
EndTable

DataTable(EmailLog,True,10)
  Sample (1,EmailResult,FP2)
  Sample (1,EmailServerResp,String)
  Sample (1,Message,String)
EndTable
```

```
BeginProg
  Scan (1,Sec,3,0)
    Battery (Batt)
    PanelTemp (RefTemp,250)
    TCDiff (Temp,1,mV2_5C,1,TypeT,RefTemp,True ,0,250,1.0,0)
    CallTable TenSecData
  NextScan

  SlowSequence
  Do
    Delay (1,1,Sec)
    'Approximately every 1 second, check for an email alarm condition
    'If the temperature has transitioned from below 27 degC to
    'to above 28 degC, send an email alarm message
    If AlarmTrigger = False Then
      If Temp > 28 Then AlarmTrigger = True
      If AlarmTrigger Then
        'Create email message body
        Message = "Warning!" & CRLF & CRLF
        Message = Message & "An alarm condition has been identified. "
        Message = Message & "The temperature is " & Temp & " degrees C." & CRLF & CRLF
        Message = Message & "Datalogger time is " & Status.Timestamp
        'Attempt to send the email message
        EmailResult=EmailSend
(ServerAddr,ToAddr,FromAddr,Subject,Message,Attach,UserName,Password,EmailServerResp)
        CallTable EmailLog
      EndIf
    EndIf
    If Temp < 27 Then AlarmTrigger=False
  Loop
EndProg
```

# Appendix C. Configuring the LS300G-EU for Dynamic IP

**Some carrier accounts are provided with a static IP address and do not require the settings described in this section.** Alternatively, accounts may be provided with a dynamic IP address, which will require the IP Manager settings described below.

- A static IP address is permanently assigned to a particular account and will always be used whenever the LS300G-EU connects to the Internet.
- A dynamic IP address is assigned on a "need to have" basis. The address can change each time the modem or device reconnects to the network. A dynamic IP address is used with a service such as IP Manager (described below) to translate a domain name to a dynamic IP address, so that the LS300G-EU can be contacted by name as if it had a static IP.

IP Manager is a free service provided by Sierra Wireless for the LS300G-EU to translate a dynamic IP address into a fully-qualified domain name, so it can be contacted directly on the Internet. IP Manager translates a dynamic IP address to a fully qualified-domain name so you can contact your LS300G-EU by name as if it had a static IP address.

**NOTE** Connecting to a modem using the IP manager service will only work if your carrier allocates individual publically accessible dynamic IP address. Please check with your carrier before trying this option.

If the LS300G-EU is configured for dynamic IP, when the LS300G-EU first connects to the Internet, it sends an IP change notification to IP Manager. IP Manager will acknowledge the change and update the dynamic DNS record. The changed IP address will then be the address for the LS300G-EU configured name. Once the LS300 IP has been updated in IP Manager, it can be contacted via name.

AceManager is used to configure the dynamic IP settings in your LS300G-EU so that it will use IP Manager as described below.

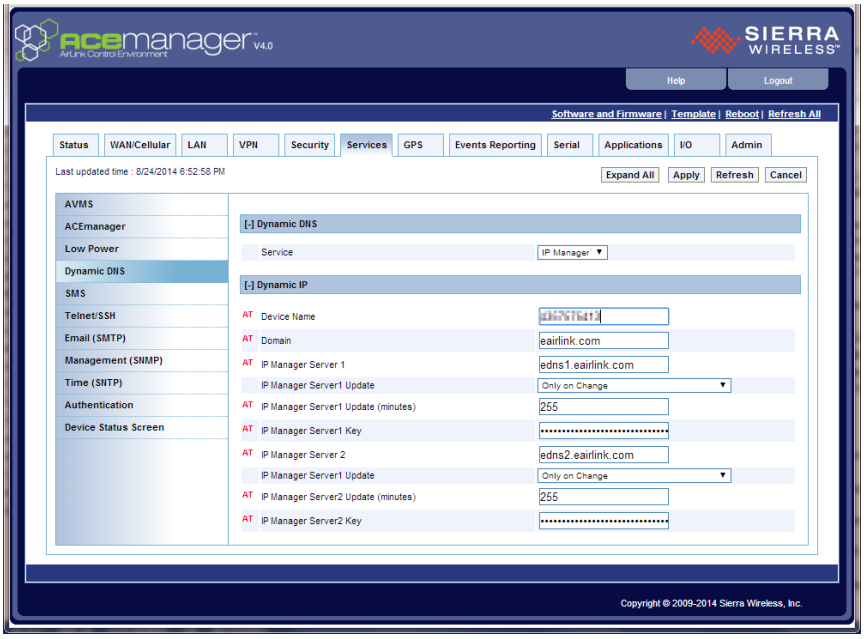
Connect with modem using AceManager. Select the dynamic IP group to configure your modem to use IP Manager.

To configure your Sierra Wireless modem to be addressed by name, the modem simply needs to have two elements configured: Enable **Dynamic DNS** and enter a meaningful name for the **Device Name**.

- Under the **Services** tab, select the **Dynamic DNS** group and use the drop-down list to select **IP Manager**. This will reveal the settings specific to this DNS service.
- Enter a **Device Name**; this is a unique name for the modem (the 10-digit MDN number is recommended).

Restrictions for Device Name:

- Must begin with a letter or number
- Can include a hyphen (-)
- Cannot contain spaces
- Must be no longer than 20 characters total




Verify that the **Domain**, **IP Manager Server 1**, and **IP Manager Server 2** are the same as above.

Click **Apply** to save the changes.

Click **Reboot** to restart the modem.

Click **Logout** to terminate communications with the modem.

In *LoggerNet/PC400*, the IP address for PPP is:

*modemname*.eairlink.com:6785

The IP address for serial server is:

*modemname*.eairlink.com:3001

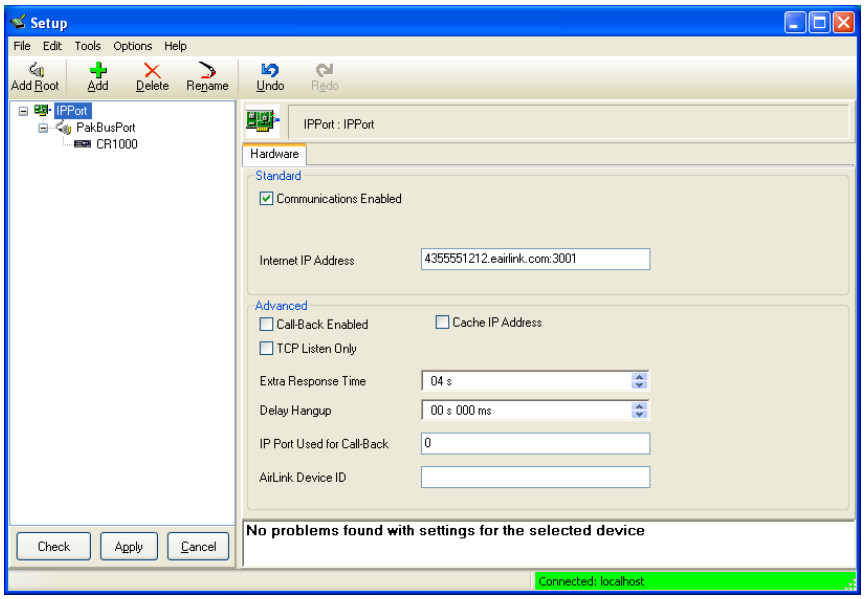
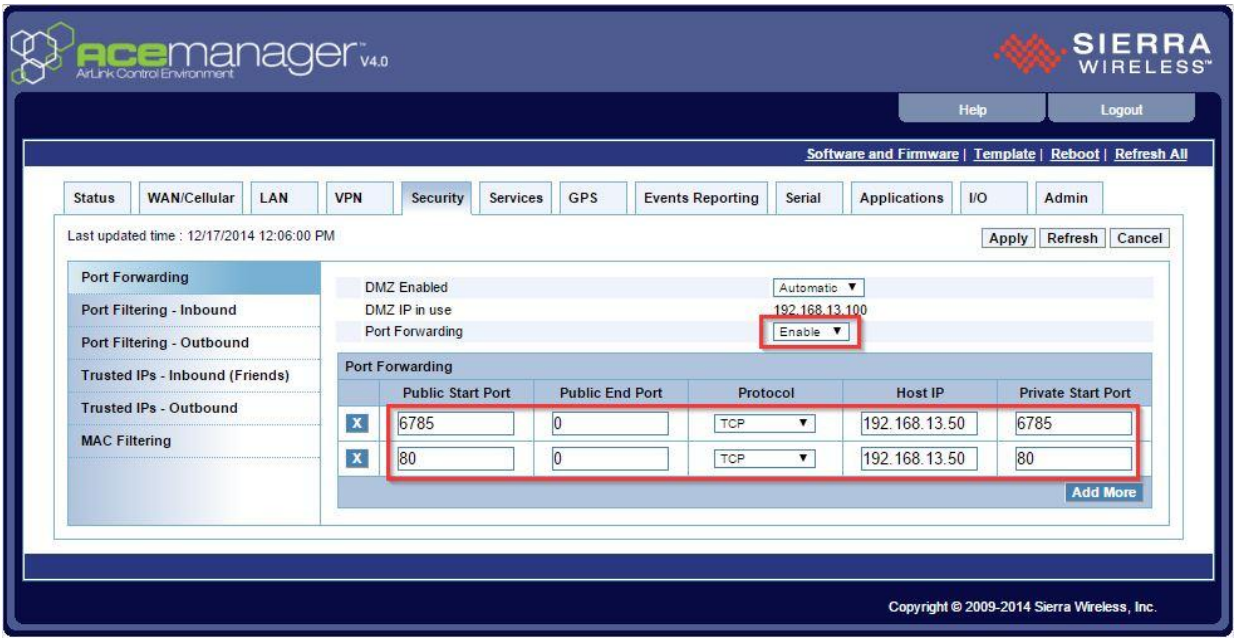



*Figure C-1. Serial Server Mode with Dynamic IP*

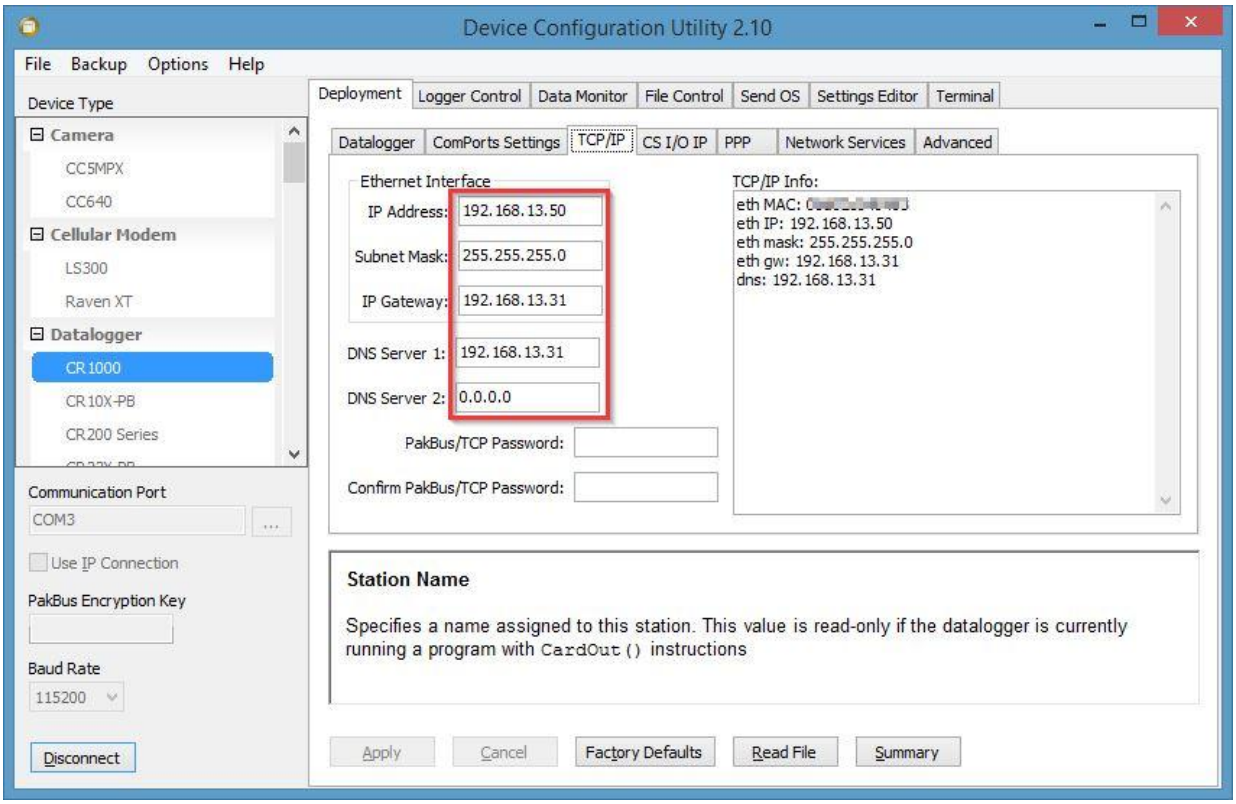
# Appendix D. Using the LS300G-EU Ethernet Port

The LS300G-EU Ethernet port can be used to communicate with IP-enabled devices such as dataloggers and IP cameras. However, the use of Ethernet communication increases the total system current demand (the modem and the device you are connecting to) by several milliamps as compared to the use of serial communication.

The following example can be used to communicate with a CR1000 / NL121 via the LS300G-EU Ethernet port. Port forwarding in the LS300G-EU needs to be enabled and specific ports need to be forwarded to the CR1000 (in this case ports 80 and 6785). Additional ports can be configured as needed. The host IP address 192.168.13.50 specified in the figure below is the IP address of the CR1000.




For this example, a static IP address, Subnet Mask, IP Gateway, and DNS is configured in the CR1000 as shown in the figure below. The example CR1000 IP address of 192.168.13.50 is the same address used in the LS300G-EU port forwarding configured previously.




Once the LS300G-EU and CR1000 have been configured and the LS300G-EU has been rebooted, you can communicate with the CR1000 via *LoggerNet* using the public IP address of the LS300G-EU and port 6785. You can also open a web browser and enter the public IP address of the LS300G-EU to see the default web page of the CR1000.

# Appendix E. LS300G-EU Settings

All of the LS300G-EU settings available from the Settings Editor in *DevConfig* are described below.

## E.1 Modem Status Tab

**Model (read only)**

Specifies the model for this phone modem.

**Modems Phone Number (read only)**

Shows the modems phone number associated with the account.

**ALEOS® SW/HW Version (read only)**

Specifies the hardware and software versions of ALEOS® on the modem.

**Network State (read only)**

Specifies the current state of the cellular radio network connection.

| | |
|---|---|
| Network Ready | Connected to a mobile broadband network and ready to transfer data. |
| Connecting To Network | Establishing a network connection; wait until the connection is established. |
| No SIM or Unexpected SIM Status | Unable to read the SIM information; check that the SIM card is installed correctly. |
| Network Authentication Failed | Unable to connect to the network because of invalid authentication data. If the problem persists, contact your Mobile Network Operator. |

**Receive Signal Strength Indicator (RSSI) (read only)**

Specifies the modems current receive signal strength.

| **RSSI** | **Signal Strength** |
|---|---|
| > –70 dBm | Excellent |
| –70 dBm to –85 dBm | Good |
| –86 dBm to –100 dBm | Fair |
| < –100 dBm | Poor |
| –110 dBm | No Signal |

**Modems IP Address (read only)**

Reports the IP address currently assigned to the modem by the cellular network. This value will always be assigned by the network. In the case of a static IP address, the network will issue the same address each time that the modem connects.

# E.2 Settings Tab

**RS-232 Baud Rate**

Sets the bit rate used by the RS-232 Port.

**APN**

Specifies the Access Point Name (APN) that will be used on the mobile network.

An APN is the name of a gateway between a GPRS, 3G or 4G mobile network and another computer network, frequently the public Internet. A mobile device making a data connection must be configured with an APN to present to the carrier.

I2GOLD (an AT&T® APN) is a special purpose APN primarily used when the functionality is needed to push data, meaning the device can receive unsolicited packets from the Internet. This APN also includes a static IP address. Use of this APN is limited to 30 devices. A Custom APN is required if you have more than 30 devices.

**Device Port**

Specifies the TCP port number used for serial server communication on the modem's RS-232 connector. This value will be set to **3001** when using **Load CSI Settings**.

**KeepAlive Ping Interval (Min)**

Specifies the interval, in minutes, at which the modem will send ICMP ping messages in order to test network connectivity. If a value of zero is specified, the modem will not send ping messages. If set to a value greater than or equal to 15, the modem will send ping messages at that interval. This value will be set to a default of 0 when using **Load CSI Settings**.

**Diversity Antenna**

This setting is use to enable the diversity antenna. When a single antenna is used, the diversity antenna should be disabled. When using **Load CSI Settings**, this is set to **Disabled**.

# E.3 Dynamic DNS Tab

**Modem Name**

Specifies the name of the modem used with the eairlink.com DDNS IP Manager server. The modem name needs to be a unique name with the eairlink server. A suggestion for a unique name is to use the 10 digit phone number associated with the modem account. This can be found on the **Modem Status** tab once the modem has been provisioned on the mobile network.

**IP Manager**

Specifies whether the modem will support dynamic DNS with eairlink.com using the value provided by the **Modem Name** setting. This value will be set to **Disabled** when **Load CSI Settings** is used.

**IP Manager Server 1 Update (Min)**

Specifies the interval, in minutes, at which the modem will send an IP address update notification to the first IP Manager server. This value can be set from 5 to 255 minutes. This message will be sent even if the modem IP address has not changed. This value will be set to 255 when **Load CSI Defaults** is used.

**IP Manager Server 2 Update (Min)**

Specifies the interval, in minutes, at which the modem will send an IP address update notification to the second IP Manager server. This value can be set from 5 to 255 minutes. This message will be sent even if the modem IP address has not changed. This value will be set to 255 when **Load CSI Defaults** is used.

# *Appendix F. Regulatory Information*

This information provided by Sierra Wireless.

## F.1 Important Information for North American Users

**NOTE**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

**WARNNG**

**Changes or modifications to this device not expressly approved by Sierra Wireless could void the user's authority to operate this equipment.**

## F.2 RF Exposure

In accordance with FCC/IC requirements of human exposure to radio frequency fields, the radiating element shall be installed such that a minimum separation distance of 20 cm should be maintained from the antenna and the user's body.

**WARNING**

**This product is only to be installed by qualified personnel!**

To comply with FCC/IC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain must not exceed the specifications listed below for the device used.

| | | **FCC ID/IC** | |
|---|---|---|---|
| | | **N7NSL8090 / 2417C-SL8090** | **N7NSL5011 / 2417C-SL5011** |
| Antenna Gain | Cellular Band | 6.2 dBI | 8.5 dBi |
| | PCS Band | 3.8 dBi | 4.15 dBi |

# F.3 EU

Sierra Wireless hereby declares the AirLink LS300 devices is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

The LS300 displays the CE mark.

CE

**WARNING** **Changes or modifications to this device not expressly approved by Sierra Wireless could void the user's authority to operate this equipment.**

**WARNING** **This product is only to be installed by qualified personnel.**

# F.4 Declaration of Conformity

The Declaration of Conformity made under Directive 1999/5/EC is available for viewing at: *http://source.sierrawireless.com/resources/airlink/-certification_and_type_approval/ls300_ce_declaration_of_conformity/*.

# F.5 WEEE Notice

If you purchased your AirLink LS300 in Europe, please return it to your dealer or supplier at the end of its life. WEEE products may be recognized by their wheeled bin label on the product label.

# F.6 RoHS Compliance

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**DECLARATION OF EUROPEAN UNION RoHS COMPLIANT PRODUCT**

Sierra Wireless Inc. for itself and its subsidiaries (collectively, "Sierra Wireless") certifies that to the best of its knowledge the products identified below to be "RoHS Compliant":

**LS300, AirLink Modem**

RoHS compliant defines that the product conforms to the requirements of the European Union's restriction on use of hazardous substances in electrical and electronics equipments directive, 2002/95/EC (RoHS directive") which limits the content of the following elements:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent Chromium (Cr6+)
- Poly brominated biphenyls (PBB) and
- Poly brominated dipheny ethers (PBDE).

The RoHS directive is with respect to any homogenous components used in the product as shipped by Sierra Wireless, in its entirety.

Sierra Wireless has reach its conclusion that the products listed above are RoHS compliant based on its knowledge and belief via internal design controls, analytical test data and information provided by its component suppliers. However, Sierra Wireless makes no representation or warranty as to the accuracy of such third party information.

Sierra Wireless, Inc.

Signature:_____
Name: John Mecher
Title: Quality Manager
Date:. September 13, 2012

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